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State of municipal solid waste management in Ukraine

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Анотація
В роботі розглянуто сучасний стан поводження з твердими побутовими відходами в Україні.
Ключові слова: тверді побутові відходи, поводження з відходами.

Abstract
The paper considers the current state of municipal solid waste management in Ukraine.
Keywords: municipal solid waste, appeal with wastes.

Introduction

The needs of modern man include, first, the needs that satisfy directly using the components of nature, and secondly, the needs that require social production to meet. These are, respectively, environmental and economic needs that exist in dialectical contradiction. Economic needs require intensive use of natural resources, while environmental needs require the creation of conditions for the reproduction of natural resources and the preservation of a life – friendly environment.

Today, the growth of the economy, population and consumption is accompanied by an increase in the negative anthropogenic impact on the environment by increasing the volume of waste and their types. The economic needs of humanity have proven to be a stronger determinant of waste generation than initiatives and measures to prevent it.

The problem of waste recycling is becoming more acute with the growth of the World's population and the proportion of people living in cities. In 1900, there were 220 million urban residents in the world, which was 13% of the total number of people who produced less than 300 thousand tons of garbage per day. Until 2000, 2.9 billion people living in cities (49% of the World's population) produced more than 3 million tons of solid waste per day. By 2025, the volume of waste generated will double [1].

If the current system of consumption and waste generation is maintained, by 2050 humanity, which by that time will have grown by about 2 billion people, will need to increase food production by 60% [2]. However, the world's population can feed themselves with less food than before if they switch to sustainable agriculture, reduce waste and stop excessive consumption, the FAO believes.

According to scientists, if the rate of growth in the amount of household waste does not decrease, the production of garbage in the world by 2100, due to population growth to 9.5 billion people and urbanization to 80%, will grow three times compared to the current level and reach 11 million tons per day [1].

Therefore, during the formation of the system of economic needs, an important aspect is to determine the optimal ratio between consumption and production, and, accordingly, for the system of environmental needs, to determine the optimal ratio of consumption and the opportunities of the natural environment.

Many scientific papers have been devoted to the problems of waste generation and rational use as a component of resource saving and greening of production [3-8]. However, the lack of research on this issue in Ukraine, which causes a number of problems in the field of waste management, necessitates further research in this direction.

Research results

For a clear understanding of the problem of waste, first of all, we study this category. Waste – any substances, materials and objects that are formed in the course of human activity and do not have further use at the place of formation or identification, and which their owner must dispose of by recycling or disposal [9]. In other words, waste is all kinds of residues of production and consumption, residues resulting from man-made or natural disasters.

Solid waste (there are still liquid and gaseous wastes) is divided into production waste and consumption waste. Production waste is understood as raw materials that are unsuitable for the production of certain products, its residues that are not used, or substances that arise as a result of technological processes that are

not subject to disposal in this production. This group accounts for 90% of solid waste. The remaining 10% is consumer waste, according to another classification they are solid household waste (MSW) [10].

Household waste-a type of waste created in the housing and communal services (household). These include waste generated in residential and public buildings, shopping, entertainment, sports and other enterprises (including waste from current apartment repairs), waste from local heating devices, estimates, fallen leaves collected from courtyards, and large-sized waste.

There is a direct connection between the existence of a relatively small mass of MSW and a huge mass of industrial waste. After all, industrial waste is formed at the first stages of obtaining raw materials used for the production of goods [10-14]. Manufactured goods become consumer waste after a short period of use. In addition, a large amount of energy is spent on the production of raw materials for future consumer goods, and energy, in turn, is one of the main producers of industrial waste. It is estimated that each ton of MSW corresponds to five tons of industrial waste at the stage of production and twenty tons-at the stage of obtaining primary resources from the subsurface.

MSW is one of the most significant factors of environmental pollution and negative impact on virtually all its components. Infiltration of storage facilities, burning of waste areas, dust formation, and other factors that cause the migration of toxic substances lead to contamination of underground and surface water, deterioration of the air, land resources, and so on.Gorenje Thus, the increase in MSW is the root cause of the accumulation of industrial waste.

According to the latest data from ecologists, Ukraine is the leader in Europe in terms of waste. Indicators of waste generation and accumulation in Ukraine indicate a threatening environmental situation in the state. According to the Ministry of ecology and natural resources of Ukraine, our country has accumulated about 35-36 billion tons of waste, 7% of the territory, and this is more than 50 thousand tons/km2 of debris collapse. Of these 35 billion tons, about 2.6 billion tons are highly toxic waste. It is worth noting that the area of landfills in our country exceeds the area of nature reserves (7% vs. 4.5%). Every year, 12 thousand illegal landfills are created in the country, because there are not enough landfills for garbage [25]. Most of the existing landfills have already exhausted their resources, and garbage dumps have become a factor of anthropogenic pressure on the environment. Every Ukrainian now accounts for more than 750 tons of waste. Between 670 and 770 million tons of waste is generated annually, or 15-17 tons of waste per capita.

According to the Ministry of environmental protection, the total volume of MSW in Ukraine increases annually by about 50 million m3, and industrial-by 175 million m3 [13, 14]. In Ukraine, the amount of MSW is not very far behind the average European one and is about 38-40 million m2 annually (or about 10 million tons). The total mass of solid waste in the country reaches 1 billion tons annually. By its composition, Ukrainian MSW corresponds to the category of transition countries.

Countries of the corresponding categories face different tasks on MSW. If in underdeveloped countries, they are primarily associated with a sanitary and hygienic problem (a large mass of unused organic matter contributes to the spread of dangerous diseases), then developed countries face more complex issues: loss of natural resources, chemical pollution, etc. In the so-called transition States (which, according to this classification, include Eastern European countries and States of the former USSR, including Ukraine, as well as a number of South American and East Asian countries), the problem of MSW should be considered as a combination of both problems.

Specific indicators of MSW formation in Ukraine average 220-250 kg / year per capita, and in large cities reach 330-380 kg / year, respectively, and these volumes have been growing in recent years by 20% per year [15], while the average European produces about 400 kg of MSW per year. For comparison, in Belgium, great Britain and Germany this figure reaches 340-380 kg/year, in Austria and Finland – about 600 kg, but in these countries almost all MSW is processed [16, 17].

For specific values of waste generation, Ukraine is in the middle of the European countries. Its indicators per person are 9.9 t / person / year. Higher figures are recorded according to Eurostat data in countries such as Bulgaria, Finland, Estonia, Russia, and Romania. The latter is due to large-scale mining activities in these countries [18].

Waste from the extractive industry (mineral) represents the dominant part (83%) of all waste in Ukraine. The volume of their annual production exceeds 360 million tons, which is the largest among European countries with the exception of the Russian Federation.

In Ukraine, in 2012, about 59 million m3 of MSW was formed, equal to about 13 million tons, which are buried in 6.7 thousand landfills and landfills with a total area of more than 10 thousand hectares. Ukrainian households in 2012 increased the amount of waste by 53.9% - to 8 million tons, and enterprises and

organizations that received permits to create waste – by 0.1%, to 442.7 million tons. Waste generation in General increased slightly-only by 0.7% to 450.7 million tons. The amount of harmful waste of hazard classes I-III decreased by 4.6% to 1.37 million tons. tons'. The share of waste disposed of in designated areas or burned without generating energy increased by 2.3% to 64.3%. In total, 143.45 million tons of waste were disposed of in 2012, or 6.7%. The volume of waste incineration for energy production increased by 35.3% to 1.08 million tons [19].

Medical waste containing dangerous pathogenic and conditionally pathogenic microorganisms is a significant threat to the environment and human health. In Ukraine, approximately 350 thousand tons of medical waste are generated annually, representing a potential risk of spreading infections [20].

A separate problem is spent electrical and electronic equipment, which makes up about 5% of all MSW, this type of waste is very dangerous, since many of them contain toxic metals – lead, mercury, cadmium, chromium and beryllium, as well as brominated flame retardants, fluorochlorocarbon, polychlorinated biphenyls, polyvinyl chloride. It is estimated that up to 70% of substances dangerous to the environment and human health that are found in MSW are contained in electronic waste [21].

Because of food waste, which according to experts is 1.3 billion tons, world producers lose up to 750 billion dollars annually. According to analysts of the Food and agriculture organization of the United Nations (FAO) [22]. According to them, food waste leads not only to high economic costs, but also puts a strong pressure on natural resources, threatening the climate, water and land resources. As the Director-General of FAO, Jose Graziano da Silva, has pointed out, we cannot afford to waste or lose a third of the food produced in the production process, while 870 million tons of food are being wasted. people are starving every day [22]. According to FAO estimates, 54% of the world's food waste is generated during production, harvest and storage, and 46% is lost during processing, distribution and consumption [22]. To reduce the amount of waste, experts believe that in the case of overproduction of food, it is necessary to reuse it for human consumption, find secondary markets or provide food assistance to vulnerable segments of the population. If the food is not suitable for human consumption, it should be transferred to animal feed.

Hazardous waste in Ukraine is also unsuitable pesticides and agrochemicals dispersed in thousands of abandoned warehouses in all regions. In the world, according to FAO, the volume of these wastes reaches 500 thousand tons. [17].

The accumulation of solid waste largely depends on weather conditions, the time of year, the degree of improvement of residential buildings, the standard of living of the population, and so on. By the way, it is not easy to determine the structure of domestic MSW – different sources contain data that often differ greatly. The total volume of MSW contains 10.3-26.4% of paper, 20-40% of food waste, 0.75-3.7% of wood, 0.2-8% of textiles, 1-5, 8% of metals, 1.1-9% of glass, 0.6-6% of polymer waste and other substances [23].

Municipal solid waste, in contrast to industrial waste, is characterized exclusively by dispersion, and now it is they who are most in the center of attention. The infrastructure for dealing with them in our country, unlike in the EU, is in its infancy. As of the beginning of 2013 in Ukraine, the number of landfills that are overloaded is 334 units (5%), and 878 units (13%) do not meet environmental safety standards [24]. Work on certification, recultivation and sanitation of landfills is carried out improperly. From 2715 landfills that need certification, 587 units were actually certified in 2012. (requires certification of 32% of the total number of landfills).

Due to an inadequate system for handling solid waste in localities, usually in the private sector, about 32 thousand unauthorized landfills are found annually, covering an area of more than 1 thousand hectares [25]. Almost all unauthorized landfills identified in 2012 were eliminated.

Collection of solid waste in our country is the main task of sanitary cleaning of settlements and is carried out by more than 7.5 thousand special vehicles of 56 specialized automobile enterprises and 650 workshops. However, the rolling stock of specialized automobile enterprises is outdated, almost 75 % of cars have worked out their life and are subject to write-off. At the 12 percent rate, only 1 percent of the fleet is restored. The high level of tariffs for providing services in the field of solid waste management has led to a decrease in the number of contracts for these services.

However, it is worth noting that today in Ukraine there are only 4 incineration plants – in Kiev, Dnepropetrovsk, Kharkiv, Sevastopol. Only Kiev works, that is, in fact, we do not have an industry for recycling and recycling [26].

It should be noted that in addition to incineration and burial, a small proportion of MSW and waste of hazard class 1-3 in Ukraine falls on the procurement points of secondary raw materials and waste processing enterprises. According to these data, it can be concluded that the discrepancy between the progressive

accumulation of waste and methods aimed at preventing their creation, utilization, neutralization and disposal threatens not only to deepen the environmental crisis, but also to exacerbate the socio-economic situation in General [17].

In Europe, 10% of garbage ends up in landfills, and the remaining 90% is put back into production [27]. In Denmark, Belgium, Switzerland, the Netherlands, Austria, France, Italy, the United States and Japan, solid waste is used as a secondary raw material. In most countries, this figure exceeds 50%. In Ukraine, this figure, according to various sources, ranges from about 5-15%, although the potential is 75 % [26].

So, the difference between Ukraine and Europe concerns not the amount of solid waste, but the lack of appropriate means of handling them, in particular, separate collection and recycling. It is worth noting that in the EU countries, the management of these wastes has been evolving over the past decade in the direction of a progressive decrease in the share of incineration and landfill disposal, although in absolute terms this share remains quite large.

Conclusions

In Ukraine, despite some progress in addressing the waste problem, the waste management strategy remains unformed. The financial security of this sector remains unstable, which should be particularly alarming. In the end, in this sense, it is necessary to speculate less about extreme situations, not solve problems in an emergency way, but, based on strategic approaches and international experience, form a pragmatic national policy.

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